



Environmental associated emotional distress and the dangers of climate change for pastoralist mental health

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ABSTRACT

Pastoralists in the Horn of Africa are among the most vulnerable populations to climate change yet little is known about how environmental change shapes their wellbeing and mental health. This paper presents a formative study into the relations between emotion, wellbeing and water security among pastoralist communities in Afar, Ethiopia. It uses focus group and interview data to demonstrate the close relationship between environmental conditions and emotional wellbeing, and shows how current water insecurity leads to extreme worry and fatigue among the studied population, especially in the dry season. In the context of difficulties of translating mental health clinical classifications and diagnostic tools in cross-cultural settings, the paper argues the inductive study of emotion may be a useful approach for studying environmental determined wellbeing outcomes among marginal populations in the light of understanding climate change impacts.

1. Introduction

In the context of global climate change, there has been a growing concern over the impact of environmental change on mental health. Acute weather events such as flooding and drought and the associated devastating loss they inflict are hypothesised to induce mental health conditions such as post-traumatic stress disorder, anxiety and depression (Obradovich et al., 2018). Ongoing sub-acute (incremental) weather events such as extreme temperatures are thought to extend these conditions (Berry et al., 2010) and recent research by Burke et al. (2018) has successfully identified a causal link between higher temperatures and suicide rates as a result of climate change in the United States and Mexico. Overall, much of the recent work on linkages between mental health and climate change has been undertaken in developed country contexts. This limits the generalisability of these studies in a global context, especially with marginalised populations who are likely to be more vulnerable to climate change (Cooper and Wheeler, 2017). Recognising the influence climate change has on mental health among vulnerable populations is important not only from a wellbeing and equity perspective, but also in terms of how it shapes a population's ability to cope and adapt to

environmental change.

Yet, one of the major challenges of understanding mental health and wellbeing in different contexts, is the diversity of cultural and social norms, values and beliefs which shape how mental health manifests and is perceived (White, 2018). Culture has been shown to influence the symptoms and type of anxiety disorders, for example, as illustrated amongst East Asian people who demonstrate increased incidences of suffering from Social Anxiety Disorder (SAD) to such an extent that the standard classification for mental disorders (DSM-5) has been amended to account for Japanese concerns over 'offending others'. It is also thought that the high incidences of depression in the USA is resultant from societal pressure to be consistently happy (Kirmayer and Ryder, 2016). These illustrations serve to underline the importance of resisting the imposition of one-size-fits-all models onto diverse communities and the value of demonstrating cultural awareness by using sensitive, inductive assessment approaches for different types of communities.

In line with these notions, this paper presents a formative study into the wellbeing of a marginal population living with continuing environmental change. More specifically, it links the notion of emotional wellbeing to experiences of water security among pastoralist

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communities living in Afar, Ethiopia. Emotion was selected as an entry point for the study due to the variation in cultural interpretation and its close links to mental health. Emotion is closely aligned to mental health as negative states of emotional well-being are an instrumental factor leading to mental health conditions. For example, Yoo and Miyamoto (2018) cite the impact of negative emotions on elevating levels of interleukin-6 (IL-6), a pro-inflammatory cytokine which is significantly associated to cause clinical depression and depressed mood (Simon, 2006; Speilberger and Reheiser, 2009). The centrality of emotion to mental health is also encapsulated in the following definition: “Mental health may be considered a person's ability to think, to learn, and to live with his or her own emotions and the reactions of others” which succinctly illustrates the importance of emotion and societal influences on mental health (Herrman, 2001 cited in Berry et al., 2010: 124). Similarly, from the health literature, the biopsychosocial model illustrates how emotion serves as a motive and guiding force by taking signals from the social-ecological environment to influence mentality (Gilbert, 2019).

Water security was selected for its tangible, assessable qualities and sensitivity to changes in the climate. Defined as: “Water security is access by all individuals at all times to sufficient safe water for a healthy and productive life,” of which climate change negatively impacts through increased incidences of rainfall variability, drought and extreme events (Webb and Iskandarani, 1998 cited in Wutich et al., 2017). Moreover, a focus on water and emotional wellbeing reflects current thinking on the evaluation of water security which has shifted towards a more human approach through the considering of other factors, drivers and stressors beyond the immediate material access to water itself (Goldin, 2013; Jepson et al., 2017). The assessment of water security is conventionally measured using the four derivative concepts: water quality, quantity or adequacy, source or reliability, and affordability (Wutich et al., 2017). Water quality in the case of domestic water use refers to the safety of that water for direct human consumption and domestic purposes. Water quantity or adequacy is the quantitative measure of water used by a specified unit, for example, by ‘litres per capita or per livestock unit per day’. Quantity of water used can vary highly due to age, use, gender, culture for domestic uses or livestock or crops, but direct observation of people's usage can be very time intensive. Water source or reliability refers to ease of access to a water supply, and water affordability is the measure of how affordable the water supply is to a user or household (Wutich et al., 2017). All of these are objective measures of water with clear utility in monitoring and evaluation of water security projects and policies, however they do not lead to the more fundamental assessment of whether a water situation is meeting the multiple water needs of an individual or community.

Taking a broader perspective of water security not only accounts for the deprivation of tangible physical goods such as taps, toilets and pipes or troughs or canals but also the intangibles such as understanding, dignity, aspirations and empowerment, which when undermined can result in emotions such as anger, shame and guilt which can then negatively impact on wellbeing (Goldin, 2013). Much of this human, relational focus is inspired by Sen's Capability Approach which comprises the two central concepts of capabilities and functioning. Sen (1999:75) describes functioning as: ‘the various things a person may value doing or being,’ such as to be adequately nourished, to choose good health, to avoid morbidity, to be happy, to have self-respect and to take part in life in the community.’ A person's capability on the other hand reflects ‘his or her freedom or opportunity to achieve this functioning’. (Goldin, 2013: 311). Adopting this approach shifts notions of water security from not just having ‘the right to access H₂O’ but to how water impacts on different relationships and hydro-social dynamics which have implications for human wellbeing and functioning (Jepson et al., 2017). For example, the implications of water security on access to education, future social status and democratic participation, as illustrated by Stevenson et al. (2012) who describes the resignation of a teacher in an

Ethiopian village due to the lack of water for basic needs, also the hours of education lost to pupils who travel long distances to collect water (Jepson et al., 2017; Gimelli et al., 2018). This broader way of thinking about water security has already inspired a number of studies (Wutich and Ragsdale, 2008; Sultana, 2011; Stevenson et al., 2012; Jepson, 2014; Sahoo et al., 2015; Bisung and Elliot, 2017; White, 2018; Thomas and Godfrey, 2018). Some of these have already made the links between water security and emotion. For example, Workman and Ureksoy (2017) reported significant levels of anxiety and depression among households in Lesotho, and Wutich and Ragsdale (2008) studied communities in Bolivia who specifically linked negative emotions: fear, worry, anger and bother to aspects of water security. This link between water security and emotion underpin the rationale for this study of the emotional consequences of living under a state of environmental change.

Emotional well-being can be defined as ‘a constellation of emotions’ or a holistic outlook which refers to the emotional quality of an individual's life experience which is determined by the frequency and intensity of emotions such as joy, fascination, anxiety, sadness, anger, and affection which can make life's experience either positive or negative or anything in between (Kahneman and Deaton, 2010; Simon 2014: 430). Frederickson and Joiner (2002) reflect on the impact emotion has on wellbeing, for example, positive emotions such as joy and happiness broaden minds to stimulate ideas, creativity and play, whereas negative emotions narrow the mind's attention leading to mental health problems such as anxiety, depression and a sense of failure. Like mental health, notions of wellbeing and emotion are highly context-specific with the interpretation of emotion significantly influenced by the set of internalised meanings, beliefs, and perceptions which people carry with them throughout life which are in turn shaped by culture and society (Lazarus, 1991; Diener et al., 2006; Leersnyder et al. 2013; White, 2018). Yet, whilst the precise emotional responses to a given situation is highly personal, emotion is also an intersubjective concept that is governed by a set of social norms regarding the understanding and performance of emotional constructs in different circumstances (Hochschild, 1979; Lutz and White, 1986). For example, Lutz and White (1986) discuss the universal needs of love and hate, and how culture influences the cognitive and/or the behavioural attempts to deal with the associated emotion and its causes. Briggs (1987) contextualises this with her studies amongst an Inuit community which cites the concept of *nallik*, which refers to a feeling of feeding the human soul and suppressing hostility. *Nallik* also involves attachment like our concept of love, however in their culture, this feeling is withdrawn towards a sick, dying relative thus conflicting with the western interpretation of this emotion and associated behaviour. In a similar sense, the lexicon hypothesis in psychology implies personality traits that are common in certain cultures will be reflected in that culture's language (John et al., 1988; Russell, 1991); therefore intersubjective emotional constructs also common in a culture will also be reflected within that language making it important to base any analysis on local-language understandings of emotional concepts rather than relying on English or another *lingua franca* (Bamberg, 1997).

Pastoralist communities within the Afar Region of Ethiopia were selected for this study as they live in a harsh, remote location and are extremely vulnerable to water scarcity. Furthermore, there has been limited success with the use of traditional conventional methods for measuring water security within these contexts. Climate predictions for the region have some uncertainty but indicate shifts in the spatial distribution of precipitation are likely to exacerbate water resource management challenges with drought a particular risk in the Afar Region (Osima et al., 2018). Traditionally, pastoralists have used mobility and a flexible system of common property rights to cope with drought, rainfall variability and other vagaries of living in arid and semi-arid rangelands (Tsegaye et al., 2013; Schmidt and Pearson, 2016). Tsegaye et al. (2013) cites the regular failings of water management approaches to take into account the heterogeneity of resources, customs

and institutions which do not conform to management blueprint. Additionally, in regions such as the Horn of Africa they have become increasingly marginalised by recent political, economic and climate trends which have stressed the resilient capacity of these populations. For example, in Ethiopia, climate change, water management and shifts in land use and management have reduced mobility and undermined water security leading to negative impacts on livestock and increase in the incidences of disease and conflict (Nassef and Belayhun, 2012; Tsegaye et al., 2013; Schmidt and Pearson, 2016). Existence under these difficult and changing conditions is already likely to have had significant implications for the mental health of these vulnerable communities (White, 2018). For example, Levy et al. (2017) discuss how extreme temperatures and patterns in precipitation are fuelling collective violence which subsequently leads to depressive and anxiety type disorders. Collective violence over resources and disputes are becoming increasingly common in the Afar Region as reported by Kassa (2001).

Awareness of how water-stress is contributing to mental health has vital significance for the future capacity of not only pastoralists' ability to cope and adapt to ongoing environmental change but also for the wider development community. It is vital that policy, legislation and strategic intervention be informed by the broader more holistic aspects of how water security influences well-being, to deliver the most effective pathways to help communities to evolve alongside environmental change. A literature review by Berry et al. (2011) indicates the impact of drought on deteriorating mental health and its consequence on a communities' ability to cope, for example the induction of psychological trauma as a result of the loss of assets and livelihood. This lead to spiralling feelings of hopelessness, eroding the motivation of farmers to 'keep going' and to continue strengthening their livelihoods. Pastoralists' livelihoods in particular present a unique set of circumstances due to their mobility, and traditional customary access to multiple water-sources. This in itself introduces a new set of circumstances in which environmental factors may influence emotional well-being and mental health, thus highlighting the importance of taking an inductive, contextual perspective. Henceforth, this research was guided by two investigating principles, the first to explore how water security shapes emotional response and consequent emotional well-being, and the second to consider the implications this study of emotion has for the livelihoods, pastoralist well-being and potential mental health outcomes in the face of climate change.

2. Methods and study site

The study was undertaken in Dullassa Woreda within Administrative Zone 3 (Gabi rasu) in the Afar Region, Ethiopia. The region is characterised as semi-arid subjecting the local population to harsh, water-stressed conditions with extreme temperatures exceeding 50 °C and receiving less than 200 mm rainfall per annum per year in some areas (Davies and Bennett, 2007). Drought is a frequent occurrence with high variability in rainfall with one main rain season every year between June and September with short showers experienced in December and during March-April (Treydte et al., 2017). The state's 1.4 million population are therefore vulnerable to seasonal water stress. Eighty-seven percent of the population reside in rural areas, with pastoralism and agro-pastoralism predominating as livelihood types, with the Afar pastoralists constituting one of the largest pastoralist groups in the Horn of Africa (Tsegaye et al., 2013). Livelihoods have become increasingly precarious over the years due to increasing climatic pressures but also government development interventions which encourage settlement into agro-pastoralism, thus restricting mobility and eroding traditional customary rights (Rettburg, 2010; Regassa et al., 2018). These stressors amongst others have seriously undermined the pastoralists' resilience to secure water in an already water-stressed environment (Nassef and Belayhun, 2012). For instance, the Afar have traditionally practised multi-species livestock production but due to the

increased frequency in drought and famine, they now focus more on camel and goat production (Reda, 2011).

Site selection was via the advice of local NGO partners and permission of local governmental officials and village leaders. Three villages were selected in Tirtira Kebele which constitutes an approximate five hour walk from Dullassa the main woreda town, along a transect of varying levels of access to water supply. The kebele comprises of a population of 2154 individuals, comprising 1206 men and 948 females. The first village: Ege, had access to an improved water source, defined as a construction which is likely protected from contamination, in the form of a motorised borehole. The second village: Tirtira, at the other end of the transect, only had access to unimproved water sources (unprotected from faecal contamination) and the third village: Adkonta in the middle of the transect had mixed access to both the improved (access to motorised borehole in Ege) and unimproved water sources. Other criteria was the standardisation of characteristics such as engaging in pastoralism, members of the same clan and similar levels of wealth. Adult participants were selected purposively using gender, age (elderly), and single status with young children to explore a spectrum of perspectives on water security and wellbeing.

An inductive approach to data collection was taken to enable pastoralists' perspective on¹water security to emerge and to facilitate a culturally-sensitive approach to investigating emotion. The study was undertaken in two research phases. The first phase was conducted in December 2017 comprised of focus group discussions (FGD) which initially used participatory mapping to contextualise the natural resources and public services in the locality, and then shifted to exploring everyday life and broader aspects of emotional wellbeing. These discussions did not focus on water security but entailed asking participants about their daily lives, what made them happy, and which aspects were stressful. Data was collected and translated from the local language: 'Afarigna' (see below for a description of this process). To minimise bias two FGDs with men ($n = 8$) and women ($n = 8$) were conducted in each village, with individuals broadly aged between 20–70 years old. The second research phase conducted in March 2018, also undertook FGD in each village using participants with similar characteristics (total FGDs: $n = 12$). In-depth, qualitative interviews in each village were also undertaken to explore perspectives of single men/women with young children, and those of the elderly (> 60 yrs) (total interviews $n = 36$), as it was assumed that these groups would demonstrate extreme vulnerability in relation to their water security and emotional wellbeing.

In the second phase, both FGD and in-depth interviews were subject to the same questioning except the in-depth interviews which asked how their specific circumstances (elderly /single with young children) impacted on their water security. Participants were initially asked to think about what the characteristics were of villages which had positive water security as way of an introduction to investigate emotion and its relation to water security. These were then listed and then ranked in order of importance. They were then asked how positive water security made them feel and to give words and their meanings which they used to refer to emotion. Exploring discrete emotions enabled deeper discussion around how their water situation made them feel, revealed subtle differences in similar emotions and the context in which they felt these emotions. This process was repeated with negative water security and participants were asked to rate their own village on water security. Both data collection activities were undertaken in the dry season, also at the end of a La Niña event 2017–2018 which increased the severity of drought. Therefore it is acknowledged that the information provided by the pastoralists may have been influenced by these events. These events can be severely detrimental to pastoralists' livelihoods through the loss

¹ It is important to note that the pastoralists' perspectives on water security are inextricably linked with their requirements for pasture. Therefore even if this is not explicitly stated, it is an important influential factor.

of livestock, water shortages and food insecurity which would palpably have a significant impacts on emotional wellbeing and subsequent perceptions of emotion. Given the potential sensitivity of data collection, protocols were reviewed by field staff from partner NGOs that work closely in pastoralist communities so to ensure the framing of discussions, especially around negative emotions, was sensitivity introduced. Furthermore, those members of the community that were deemed likely to be marginalised in group discussions were engaged in the research via one-to-one interviewing rather than the focus groups. The protocols and broader study design were approved via the [institutional review board details withheld to preserve blind-peer review] (ref: XXX).

The analysis of emotion in this cross-cultural context was approached initially with project partners who spoke 'Afarigna' local language. They translated English words denoting positive and negative emotions into *Afarigna* and then another Afar partner translated this translation back into English. Transcribers had a dictionary of these translations as a guide, also example words in English to use as prompts to guide the discussion. To investigate valance, which is a measure of positivity and negativity associated with an emotion, participants ranked positive emotions from most pleasant to least pleasant, and negative emotions from most negative to least negative. Arousal, which is associated with the extent to which emotion promotes heightened physiological activity, was identified through participants characterising how an individual behaved when experiencing a particular emotion. The facilitator then made a judgement to whether the emotion was active or passive. Results from both FGDs and in-depth interviews were combined for data analysis to enhance data richness. Data was thematically coded and the meaning of each emotion was decided through alignment with the most frequent interpretation of each word. The mechanics and framework for analysis are elaborated throughout the results section.

3. Results

Respondents revealed a complex and rich lexicon of emotions experienced in relation to water security. Emotions most frequently referred to are illustrated in Fig. 1. Emotions are placed according to valance (horizontal scale) where the left side depicts negative emotions and then emotions become progressively more positive towards the right-hand of the scale. Whereas the vertical axis separates the emotions into four valance-arousal states. Each of these states (quadrants) is labelled categorically according to the general affect of the state, i.e.

anxiety (negative-active), enthusiasm (positive-active), depression (negative-passive) and comfort (positive-passive). These labels are utilised here as shorthand descriptors to indicate affective states within more complex mental and behavioural constructs and are not meant to denote the entirety of 'anxiety' and the other three constructs (Warr, 2012:4). Overall, of the total number of words elicited for emotion ($n = 32$): 25% of words pertained to the positive-active valance/arousal state, 28% were recognised as positive-passive, 33% were identified as negative-active and 16% were identified as negative-passive. Of all positive emotions ($n = 17$), 53% were established as positive-passive, and 47% were established as positive active, whereas of all negative emotions ($n = 15$), 67% were negative-active and 33% of emotions were negative-passive. In the rest of this section, the narrative describes the different emotional states, how they link to water security and how frequently they were linked to different aspects of the pastoralist water security situation. It covers positive emotions before going on to focus on negative emotions.

3.1. Positive emotions

Estrahina meaning 'extreme happiness' was the most frequently mentioned and ranked as most pleasant. Described as: "A feeling that someone has when all their needs are fulfilled. Similar to being ecstatic. When people feel this way, they start playing traditional games, singing and dancing." (Single man with young children, Adkonta). When: "I'm not thirsty and I don't have to go far. Water is available for animals, for cooking and for all my needs" (Elderly man in Ege). *Ferhi* was also frequently mentioned, described as the sense of happiness felt when they found themselves in better circumstances, as elaborated by the following: "This is a feeling someone has, when they get something they didn't have before. For example, it is a feeling felt when we don't have to travel for water." (Woman with young children in Ege). *Haye* meant the feeling of confidence, empowerment and security, as illustrated by the following: "This is a feeling that expresses being secure and confident. This is a feeling you get when you have everything in abundance, e.g. water, pasture, more than enough milk and butter" (Elderly man from Ege). Pastoralists also stated *Meane* which refers to the feeling of having everything and experiencing abundance.

The emotions: *Estrahina*, *Ferhi*, *Haye* and *Meane* were all characterised as active emotions and all were ranked as more pleasant than passive emotions. The most frequently stated positive, passive emotions were *Afle*, *Rufa*, *Gada*, *Noka*, *Selam* and *Tuhina*. *Afle* was

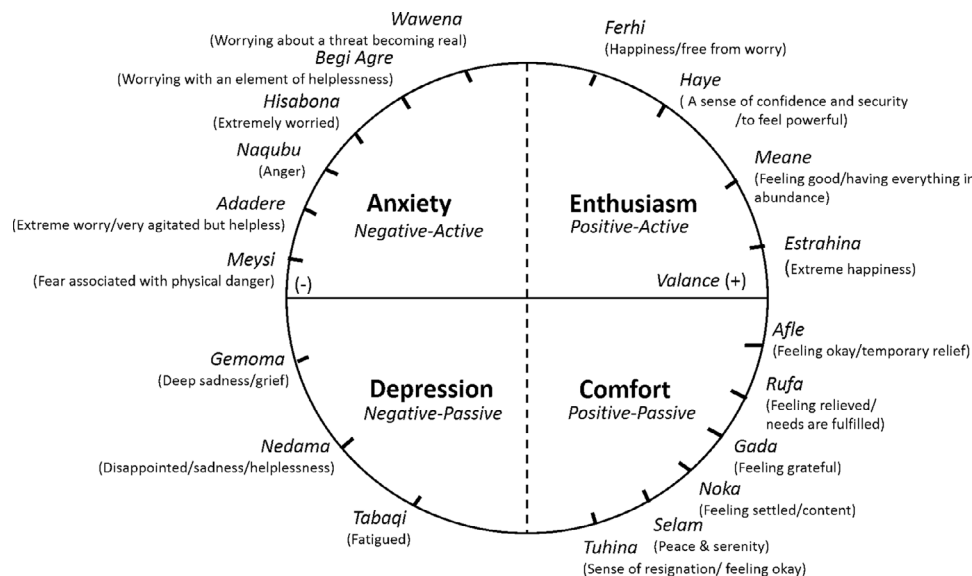


Fig. 1. Positive and negative emotions associated with aspects of water security situations most frequently elicited by Afar Pastoralists ($> n = 5$), Ethiopia (Adapted from Russell, 1980 and Warr, 2012).

described as follows: “A word used to express feeling temporary relief, for example, when we get rain for a short period of time, a day or two, in the middle of drought” (Elderly woman in Ege). ‘*Rufa*’ was characterised as a feeling of when needs were fulfilled but with a longer term sense of security than ‘*Afle*’. ‘*Gada*’ was described as feeling thankful or grateful, ‘*Noka*’ was used to describe feeling settled and content, ‘*Selam*’ referred to peace and serenity, the feeling of being free from fear and ‘*Tuhina*’ was elicited during discussion of positive emotions and denotes a feeling of wellness (feeling okay) due to resignation to a specific set of circumstances. However levels of positivity were indicated as lower for this emotion than other positive emotions hence its location towards the centre of the valance axis. . Other positive emotions less frequently stated were: ‘*Asokote*’ (active): having more time to enjoy oneself, ‘*Buragena*’ (active) feeling joyful, ‘*Dessa*’ (active) extreme happiness, ‘*Halala*’ (active) feelings of joy and being playful, ‘*Kahano*’ (passive) feeling loved, ‘*Maqane*’ (passive) feeling good and ‘*Saya*’ (passive) the opposite of fatigued and feeling secure.

Positive emotions felt in relation to their water security were elicited in the context of the rainy season referred to as ‘*kharm*.’ Pastoralists perceived the rainy season as a time where they had enough water for their needs which could be as little as for a one week time period. During this time, men referred to no longer feeling worried over where to take the herd for water and pasture, and having enough food. Women discussed having the time to sit under the tree and churn butter, whilst both men and women engaged in social and cultural events including dancing, singing and playing football. Women described being happy because they had time to braid each other's hair, commenting that: “Even older women look beautiful,” whereas men referred to the reduction of conflict and welcomed alternative employment opportunities such as crop cultivation. The daily milking of livestock was the livelihood task which gave both men and women most enjoyment as it was the easiest task and nourished their children. Women also favoured any activity that could be done within the home, such as milking, cooking, baking, milk churning, handicrafts, and in the case of Ege, fetching safe, clean water from the borehole. Men expressed favour towards looking after livestock and practising religion, which they had more time to do during the rainy season.

3.2. Negative emotions

Negative emotions were discussed more frequently among the pastoralists. ‘*Meysi*’ meaning fear from a potential danger was ranked as the most unpleasant and experienced by men during risk of conflict with other tribes or from attack from wild animals whilst collecting water at night. Women felt ‘*Meysi*’ when they could not collect enough water for their children and feared for the safe return of their husband and children when out searching for water. Equally ranked in unpleasantness was ‘*Gemoma*’ described as a ‘deep sadness,’ indicating grief and intense feeling of loss, as described by the following pastoralist: “If all my cattle die, I can feel ‘*Gemoma*’. ‘*Gemoma*’ is an emotion felt afterwards. It can be felt by someone who has lost his cattle due to drought” (Elderly man in Ege) and “This feeling involves deep sadness and silently contemplating after something bad has happened” (Elderly woman in Ege). ‘*Adadere*’ was ranked second most unpleasant, meaning to be extremely worried and agitated but with an element of helplessness. Those experiencing ‘*Adadere*’ felt alone and abandoned, for example, through loss of a partner or cattle from drought. “They worry about the future and some may consider committing suicide.”

All pastoralists referred to the emotion ‘*Hisabona*’ meaning very worried. “This is a feeling I get when I don't have water, children are crying at home and my wife has been gone a long time to fetch water. Also, when I don't have enough water for myself, my cattle and when there is no water to cook food with” (Elderly man in Ege). “It refers to being worried, for example, worry about who will take my cattle to a water point or how do I find water.” (Elderly woman in Adkonta). Also mentioned was the emotion ‘*Naqabu*’ meaning ‘anger.’ “We feel this

when we go to the land of the Argoba people in search of water and we are prevented by the people from using the water there.” (Man with young children in Tirtira). ‘*Begi agre*’ meant to be worried but also with a feeling of helplessness. Illustrated by the following examples: “This is a feeling of being under pressure and stretched. For example, this is felt when there are competing tasks you need to carry out. You feel this way when your cattle, camels and goats need to be taken to a water point at the same time (they were usually kept separately and taken to water sources at different times) and your children are young and can't help you and you are confused about what to do.” (Men in Tirtira, Source: FGD). “You will feel this way when your cattle get emaciated and no one wants to buy them and you have no money to buy food.” (Elderly man from Ege). The emotion: ‘*Nedama*’ meant feelings of disappointment but laced with sadness and helplessness, as described by the following: “*Nedama* is feeling helpless, when something is beyond your ability to fix. For example, when I can't find water and cook food and feed my family, I have this feeling” (Women in Tirtira, Source: FGD). It also “refers to feeling disappointment, not getting what you wanted or expected. For example, when you go to a water point and you don't get water” (Men in Tirtira, Source: FGD). They also referred to ‘*Tabaqi*’ which meant to feel fatigued: “It means feeling tired or fatigue. Women feel this when digging the river bed to get water and when men take cattle and search for water” (Elderly Man in Ege) and “Feeling fatigued. They feel this way when they travel long distances or have to dig the river bed for water that is not sufficient for their needs” (Men in Tirtira, Source: FGD). ‘*Wawena*’ referred to a state of being worried of a perceived threat. For example, the worry of not finding water when setting out to search, for a son whom has been captured by another tribe or for children left back home when searching for water. Other emotions elicited by fewer pastoralists were ‘*Bolulu*’ (active) meaning to feel uncertain, ‘*Dokia*’ (active) the fear of being killed or attacked, ‘*Iyedede*’ (active) to feel destitute, ‘*Agriina*’ (passive) ‘extreme fatigue,’ ‘*Wagisah*’ (active) to worry about the future, ‘*Tarena*’ (arousal status unidentified) the feeling of being displaced and ‘*Qansarina*’ (passive) a feeling of loss and fatigue but connected to material aspects of livelihood, e.g. loss of livestock. There were no trends detected regarding the eliciting of either active or passive emotions.

3.3. Linking emotions to current water security

Negative emotions reflected how pastoralists felt about their current water security situation referring to the dry season. These emotions and their affect state are illustrated in Fig. 2 ‘*Hisabona*’ was the most frequently mentioned indicating consistent worrying. ‘*Wawena*’ was another common negative-active emotion also describing worry but about a perceived threat, such as thirst. ‘*Meysi*’ or fear was also a referenced, and ‘*Adadere*’ and ‘*Begi-agre*’ both of which related to a sense of disempowerment and of helplessness were also mentioned responses in the negative-active quartile of the model. In the negative-passive quartile, ‘*Tabaqi*’ and ‘*Nedama*’ were the most frequently mentioned referencing the fatigue from the time and energy spent collecting water, and the disappointment ones feels in not having needs met. No positive emotions were used to describe the pastoralists’ water security at the time of the study.

Feelings of negative well-being were experienced at times of water insecurity and the dry season. The long distances travelled by men searching for water and pasture resulted in feelings of displacement from their family for both men and women. Men could travel up to 12 h to their nearest water source risking fatigue and dehydration; sometimes taking them into other zones where they risked conflict with other clans. Men in particular referred to the daily struggle for water precluding any enterprise into other livelihood pathways such as crop production which could potentially strengthen food security and lessen their feelings of worry and fatigue. They ranked having enough water to diversify into multiple livelihoods as a priority. Respondents were also forced to become reliant on scoop holes referring to the digging into a

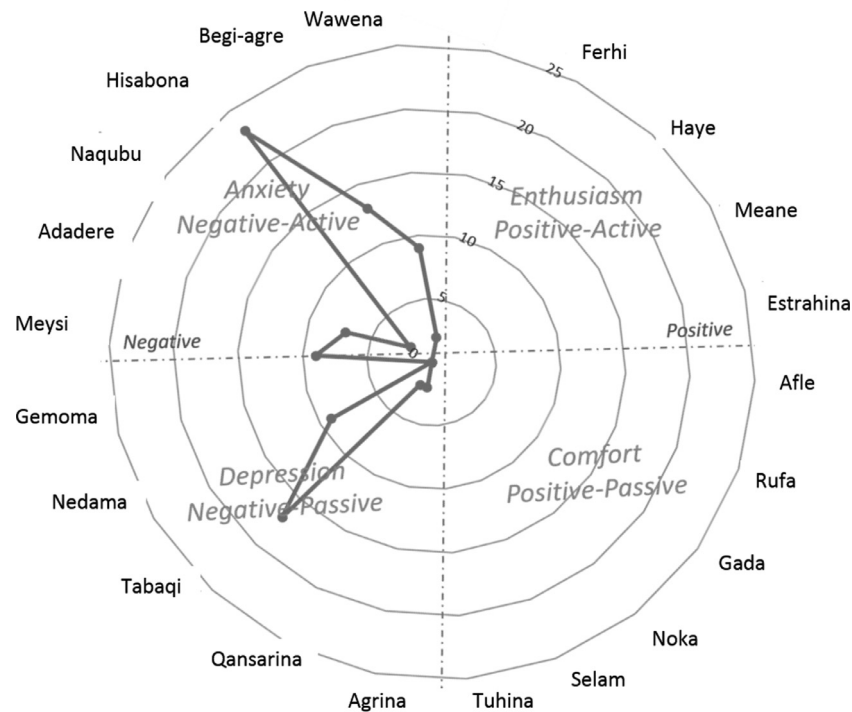


Fig. 2. Emotions (%) experienced by pastoralists in response to their water security situation in the Afar Region, Ethiopia ($n = 48$).

dry river bed to reach the water beneath. This required much time and energy and yielded insufficient quantity and quality of water. Frequently the water was turbid and smelt badly and occasionally carcasses were found in the river bed. One respondent explained, the water was unsuitable for young children and had to be boiled first. In Ege, water was also described as unaffordable, as they had found the ongoing costs of diesel for the borehole too expensive. Its functioning was also intermittent due to shortage of diesel and other technical problems.

No differences between genders were detected regarding the lexicon and expression of emotion described in relation to water security. This was surprising, as there was a strict division of labour between men and women in these communities which shaped water needs and could potentially influence emotional well-being. For example, women were responsible for household duties and would travel long distances daily searching for water. Water would be returned to the homestead in a container either on their backs or on a donkey. Women explained that queues were common at dwindling water points and/or they would expend energy in digging scoop holes to obtain poor quality water. Whereas men's responsibility to secure water (and pasture) for their livestock resulted in long periods spent away from family, also experiencing irregular meal times and exposure to hunger and thirst. Likewise, no major trends were detected between villages indicating a similarity in expression of emotions to water security across the population.

However, water security placed an immense burden on single-headed households who had young children. Both male and female single headed households were affected by the hardships they faced over the conflicting priorities of daily chores without having an adult partner or older children to share these duties. Women described the feelings of worry and frustration they felt over having to fetch water but also to bear full responsibility for young children as described by the following: "I have to carry water on my back. I also have a young baby. I can't carry my baby and at the same time load my donkey and take it to a water point. It is hard to do. My problem worsens in the dry season" (Woman with young children, Source: In-depth interview). However it

was also implied that men shouldered 'double burden' as they all referred to the pressure they felt having to perform domestic chores normally undertaken by women. Other vulnerable members of the community were elderly pastoralists. They all described a worsening change over time regarding their water security, explaining that years ago rainfall was more frequent than it is now, that they did not have to walk long distances, and were able to keep more livestock as a result. One elderly male explained that he felt more pressure now than in the past when finding and collecting water. They used to have enough for their needs but now they don't even have enough for washing. An elderly female described when she had to collect water unassisted she felt fatigued and also feared that she might physically injure herself or it might get dark before she was able to return home. This formative data implied that certain types of household were more likely to report negative emotional wellbeing but that across the population negative emotions were associated with the present water security context across the communities.

4. Discussion

The specific nature of the pastoralist livelihood in Afar means an extreme dependency on the local environment to meet basic human and animal needs, such as water and food. This exposes the population to acute vulnerability associated with the environment, especially in relation to water availability, and environmental change. This exploratory research has sought to provide a contextually sensitive picture of the links between this environmental context and emotional wellbeing, and shows that seasonal environmental change in relation to water security exposes populations to significant levels of emotional distress. This connection between water and wellbeing among these populations manifests in complex ways but it is clear that water security realities in the dry season, such as travelling long distances to fetch water or fear of running out of water for cattle, are consistently associated with negative emotional responses across the population. These negative emotions directly linking to the immediate lack of water supporting other studies such as Aihara et al. (2016) and Stevenson

et al. (2016) who also note how the lack of water directly impacts on psychological distress. Although the specific findings from the study are limited to this snapshot, climate change predictions indicate a growing risk of drought and water availability in the region (Osima et al., 2018). Climate change presenting one risk among broader demographic and development pressures such as land appropriations, settlement programmes and invasive species. (Tsegaye et al., 2013; Few and Tebboth, 2018). It is expected that water security vulnerability will intensify over the coming decades for these populations.

Given the emerging connections between climate change and mental health in Western populations which are less directly vulnerable to shifts in climate, it seems reasonable to also expect such trends may manifest in pastoralist populations. There are some important caveats to this assertion, however. First, pastoralist livelihoods have manifested and thrived in these harsh environments and this livelihood characteristic of experiencing and thriving within vulnerable contexts is inherent within the very way of life. For example, through the practice of multi-herding techniques such as splitting livestock into home (*homa*) and satellite (*magida*) herds to promote better productivity and growth of offspring, also the feeding of acacia pods to goats when grass is completely grazed (Gebre-Mariam, 1991). As such, one could expect a normalisation towards such contexts and not associate emotional responses to water insecurity which are especially negative. Second, the unique cultural context and specific experiences of wellbeing and mental health may manifest in specific ways that do not reflect findings from similar research in Western countries. Yet, we believe this study goes some way to overcoming these caveats as it shows pastoralists do associate water insecurity risks as leading to negative emotional states with the population. This holds true across gender and the different village contexts we have examined. At a basic level, we believe this warrants greater attention to these issues. There is clear research need to dig deeper through larger empirical studies on these phenomena as well as begin the discussion about how public policy and development interventions can be adapted so to address the consequences of climate change on wellbeing and mental health within pastoralist communities.

We have shown that a diverse lexicon of words used to describe emotion were elicited by the pastoralists in connection to their water security situation and they pertained to all four valence-arousal states. They formed a distinct dichotomy of emotions which aligned directly with seasonality. Positive emotions were only discussed with reference to the rainy season (*kharmā*), and negative emotions were only mentioned in the context of the dry season. It stands to reason that positive emotions would be more associated with the rainy season as this was the time that their water security improved along with adequate food security, and pastoralists had more time to socialise and engage in cultural events. As observed by Gebre-Mariam (1987) who also notes the increase in time available to engage in other activities in the rainy season and also documents the labour inputs of the Afar in the dry season, bearing witness to the increased work load during the drier months in searching for grazing, travelling to the other regions to buy grain and the digging of wells, all of which took immense amounts of time. During the rainy season, positive-active emotions like *Estrahina* and *Haye* were ranked as more pleasant than positive-passive emotions. Meaning that the pastoralists were ranking those emotions with higher arousal than the passive emotions which had lower arousal. It is highly plausible these intense emotions were highly related to *kharmā* as a result of the short period which pastoralists had enough water for their needs. Levine and Safer (2002) state that people tend to remember their emotions fairly accurately when it comes to specific events. However Levine et al. (2009) report bias in remembering emotion, as people tend to over-estimate emotional intensity by focusing on moments of peak emotional intensity, which may explain the lower ranking given for the less intense, more diffuse, positive-passive emotions. The meanings behind positive emotions also tended to be more cogent and discrete than the negative emotions which demonstrated more nuanced layers of complexity, for example the referencing of different aspects of worry.

Ben-Ze'ev (2000) explains that negative emotions tend to exhibit more differentiation than positive emotions because we tend to ruminate on them more, which is easy to comprehend in the case of the pastoralists due to the considerable length of dry water-stressed conditions which they endure. Negative emotions are also diverse as they hold more 'functional value' than positive emotions, as not responding to negative emotions can ultimately lead to dire consequences such as death, whereas not responding to positive emotions presents fewer repercussions. This is illustrated by the highest percentage of emotions pertaining to the negative-active state and the pastoralists ranking *Meysi* meaning fear, as the most unpleasant negative emotion. Felt by pastoralists under extreme circumstances of conflict with other tribes, or with the uncertainty of finding water, both presenting risk from circumstances such as morbidity or death.

It is well established that society and culture have a significant influence on emotion. Individuals do not function in isolation and emotions are the result of a complex set of inferences embedded in situational experiences and personal and social discourses which are culturally defined and socially performed (Hochschild, 1979; Illouz et al., 2006). Illouz et al. (2006) explain that all societies have emotional standards of which there is usually a lack of awareness, or are largely unspoken and can vary temporarily, spatially and socially between societies and social groups. Tensions also frequently exist between the institutional 'what is expected' expression of emotions and the individual's own experiences. Afar pastoralists are socially organised within an ancient clan system which is characterised by extremely close knit ties (Reda, 2011). These ties are reinforced through solidarity and cooperation between lineages (*'dhalla/gulubu'*) and clans (*'kedo'*) through the sharing of rituals, resources and the practicing of patrilineal cross-cousin marriage (*'absūma'*) (Kassa, 2001). These systems are bound to be influential in how emotions are expressed. It is these strong linkages and bonds that have contributed to the survival of the Afar in such a harsh environment; this reciprocity pivotal in the sharing of resources and the building of social capital during hard times (Reda, 2011). The Afar are traditionally recognised for their displays of anger and aggression evolving from power, influence and fierce rivalry over scarce resources (Menbere, 2013). However the expression of anger '*Naqubu*' (negative-active) was not a prominent emotion when pastoralists selected emotions to illustrate their own water security situation. Culturally the failure to control emotions by a single man such as anger is frowned upon, as illustrated by the proverb: '*Cafin Hara Aynuhara Gababeta*' which means 'a burning dry wood causes wet leaves to catch fire too' which refers to the disruption negative-active emotions cause for the remainder of the clan (Reda, 2011). Emotions tended towards the feelings of worry and tiredness which could be indicative to there being too few resources for their needs. *Hisabona* (negative-active) was the most frequently mentioned meaning very worried, *Tabaqi* (negative-passive) meaning fatigue and *Begi-agre* (negative-active) meaning being worried within an element of helplessness. *Hisabona* was used within the context of extreme water stress when there was not enough water for their needs and there would be consistent worry about the future of their family and livestock. *Begi-agre* involved a similar levels of worry but this emotion was felt when all available options to cope were exhausted, and *Tabaqi* was frequently used in relation to the long distances travelled for water, the carrying of heavy containers and the digging of scoop holes. There is little disputing that consistently experiencing negative emotions can have a detrimental impact on emotional well-being, and such emotions are associated with chronic mental health conditions such as anxiety and depression (Simon, 2006; Pressman et al., 2013). The persistent long periods of difficulty and toil in obtaining water in the dry season, plus the unrelenting concerns for their future were contributing to prolonged exposure to these emotions. Spielberger and Reheiser (2009) explain that over short periods, experiencing these emotions can help to achieve goals but over longer periods can turn morbid and pathological, which is a worry in terms of the development of mental health

conditions in the context of climate change.

5. Conclusion

This paper seeks to focus attention on the probable links between the environment and the mental health of vulnerable populations in developing countries. It highlights this as a gap in the current literature but notes the methodological and conceptual difficulties of studying such phenomena across cultural settings. Differences in societal norms and culturally informed patterns of behaviour mean that the simple translation of conventional approaches may not be appropriate whilst there are ethical and moral questions regarding the imposition of one-size-fits-all mental health categories onto culturally distinct populations. Instead, an emphasis on inductively studying emotional response and emotional wellbeing are proposed as a route into this terrain for marginal populations. The paper presents a proof-of-concept of such thinking via the presentation of formative field results from a study into the links between water security and wellbeing among pastoralists in the Afar, Ethiopia. These illustrate how pastoralist populations describe and categorise different emotional states and link these to different experiences of water security. Applying such thinking to their present situation, they overwhelmingly associated their water situation with negative emotional wellbeing, in particular extreme worry and fatigue during the dry season, illustrating that pastoralists' reported emotional wellbeing is shaped by such environmental conditions. In a climate change context in which the lowlands in the Horn of Africa are predicted to be highly exposed to higher risks of drought and issues with water availability this would suggest climate change is likely to further entrench such negative emotional wellbeing.

Declaration of Competing Interest

None.

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Supplementary materials

Supplementary material associated with this article can be found, in the online version, at [doi:10.1016/j.gloenvcha.2019.101994](https://doi.org/10.1016/j.gloenvcha.2019.101994).

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